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ABSTRACT

Providing a context for discussion rather than an insider's point of view, this report discusses the current state of reading research. The report reviews differing visions of educational reform of reading instruction espoused by supporters of phonics and by supporters of the whole language approach. The report then proposes four criteria for use in selecting future research projects--attack the most important problems, attack problems whose solutions will lead to the greatest advance in knowledge, attack problems the field can solve, and attack problems whose solutions can be implemented readily. The report concludes with a discussion of five areas for future research: (1) the nature of reading; (2) learning to read and write; (3) the acquisition of knowledge; (4) critical reading and thinking; and (5) the education of reading teachers. (RS)

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Center for the Study of Reading

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Abstract

This report discusses the current state of reading research, reviews differing visions of educational reform, proposes criteria for use in selecting future research projects, and identifies five areas for future research: the nature of reading, learning to read and write, the acquisition of knowledge, critical reading and thinking, and the education of reading teachers.

THE FUTURE OF READING RESEARCH

Reading is not a neutral topic. Any program of research and development in reading must be conceived in full knowledge that reading has extraordinary consequences for individual people and for the nation. Further, such a program must be conceived with the understanding that reading is a public concern. Researchers agree that reading is the essential prerequisite for school achievement, as well as for eventual personal and economic success. Parents and teachers know reading is important. They care passionately that children learn to read. They know that the child who succeeds in learning to read will find other school subjects accessible, while the child who cannot read well is certain to encounter difficulty in those subjects.

Every first grader knows that you go to school to learn to read. Children who accomplish this rite of passage feel good about themselves. Children who do not accomplish it experience low self esteem and frequently become unpopular among their classmates.

There is a depressing stability to test scores and other educational indicators after the first grade: The first grader who cannot independently read stories from the reader by the end of the year is already at grave risk for school failure. Children from any walk of life may face difficulty in learning to read. However, the incidence of slow progress and outright failure is highest among poor children, children from homes low in literacy, ethnic minority children, and children who have limited proficiency in English. Children who become accomplished readers despite these life circumstances have a springboard for breaking the cycle of poverty and ignorance. Those who make unsatisfactory progress in reading, however, become even more vulnerable to failing in school, to dropping out, and to the accompanying social risks. The highest priority for reading research and development must be to discover and put into practice the means for reaching children who are failing to learn to read.

Other problems await some children. For example, many who have learned to read, at least in a rudimentary way, are unable to use what they have learned to unlock the secrets of science, history, and other school subjects. As a consequence, students may not appreciate what it means to have a conceptual understanding of an area of knowledge. They may not know how to go about acquiring knowledge. Thus, a high priority for reading research and development ought to be to discover how to help all children acquire knowledge from the written word.

In preparing this report, I have tried to present a broad view of the field of reading research. I have tried, as well, to make the message of the report accessible to a diverse readership. I have, therefore, avoided the heavy use of statistics and citations of scholarly works. I have tried to provide a context for discussion rather than an insider's point of view.

State of the Art in Reading Research

The very conception of reading, learning to read, and the teaching of reading are changing, thanks in considerable measure to research that flies the banner of cognitive science. It is now widely understood that readers *construct* the meanings of texts. That is to say, it is generally accepted that the building blocks for the meaning of a text include not only the words on its pages but the reader's purposes and point of view, analysis of the context and author's intentions, and already possessed knowledge and beliefs about the topic. Skilled readers swiftly and effortlessly integrate information from various sources as they build the meaning or representation of a text.

To extend the idea of *constructivism*, previously separate strands of research and theory recently have been amalgamated under the banner of *social constructivism*. Not only do psychologists and computer scientists espouse this idea, but also anthropologists, linguists, political scientists, and literary theorists.

The central idea is that the individual is the creature of culture and, thus, that learning and development must be construed as socially situated. Other important ideas with origins in recent scholarship that are influencing reading education include the notions of *phonemic awareness, automaticity, schema, story grammar,* and *metacognition.* Although these ideas have had wide currency among reading researchers, potential for their use in instructional materials and teaching methods has only begun to be realized. Following the Russian psychologist, Vygotsky, the premise is that children acquire the ways of thinking of those around them by internalizing speech patterns.

On the other hand, some ideas from recent research have been misinterpreted and overextended, in part because the ideas themselves are still being refined. For example, the idea of a schema has not explained how people cope with novel situations, and is now taking a back seat to the notion of mental models that readers "cut and fit" to use in particular circumstances.

One achievement of the past 15 years has been the clear articulation of the structure of simple stories and how implicit knowledge of this structure assists students in comprehending, learning, and remembering. The application of the tools of cognitive science to the analysis of stories did not begin until the mid 1970s. Yet the bibliography in a recent review of story research lists over 100 books and articles with publication dates after 1975.

The structure of stories has been represented in so-called *story grammars* that decompose stories into major plot elements. Research shows that the concept of a story grammar has psychological reality. For example, when stories are rewritten so that the plot elements are out of order, people shuffle the elements back into the right order when asked to recall the stories. Studies show that children taught a story grammar are better able to comprehend stories and, when composing stories of their own, are more likely to make them complete. Contradicting the often-expressed view that implementing research takes interminable lengths of time, research on stories had an almost immediate impact on classroom practice. It is probable that a large proportion of the primary school teachers in the country is familiar with research on story structure and is using it in teaching.

Yet a second round of story research revealed complexities overlooked in the initial rush of enthusiasm. By the standards of what counts as a grammar of sentences, theories of story structure are not really *grammars*. These theories cannot account for the structure of stories of any complexity, for instances, those involving multiple episodes or many characters. The early theories did not deal with the point, or moral, of stories. The early theories of stories did not take into account that stories are usually structured so as to evoke feelings of curiosity, surprise, or suspense.

The fear is sometimes voiced that premature application of research will have a mischievous effect on educational practice. Yet no evidence indicates that overly simple models blinded teachers and children to the richness and complexity of literature or prevented them from pursuing deeper meanings. The evidence is, rather, that ideas from story research have helped teachers help children to better understand stories.

Reform in Reading Instruction

Most teachers, principals, and college faculty concerned with reading instruction can be described as eclectic. They pragmatically consider ideas and approaches to teaching from various sources. Whereas this may seem an unexceptionable professional attitude, it is regarded with suspicion by the ideologically committed. By their lights, typical reading educators are the ones who need to be "reformed."

One group of reformers believes that the root cause of reading failure is the lack of phonics instruction. This group contends that children will get off to a better start as readers if they first receive systematic and intensive phonics instruction. In fact, reviews of research over the years have consistently concluded

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that, on the average, children who receive phonics instruction do make somewhat better progress in reading (e.g., Adams, 1990).

Whether more phonics is a cure for reading failure is another matter, however. Indeed, whether direct instruction in letter-sound relationships will ultimately prove to be the best way to get children started in reading must be regarded as an open question. Seldom acknowledged by phonics firsters is the fact that most children in most classrooms in the U.S. *do* receive a lot of phonics instruction. Yet, an unacceptably large number of these children do not learn to read well. Unfortunately, the rancor with which phonics advocates on the extreme press their case has caused many parents and teachers to turn away from phonics instruction.

Partly in response to the xenophobia of the extremist phonic advocates, another group of reformers has emerged. Members of their group believe that the cause of reading failure is too much phonics instruction. The movement has as its rallying cry "whole language." Defining whole language is difficult, because advocates insist that it is a philosophy not a method. One of the central ideas is that learning to read should be addressed holistically, specifically that reading should not be broken down into component skills that are taught one at a time. This means whole language advocates are against phonics instruction, at least as it is done traditionally. Other features of the philosophy include the belief that learning to read should be natural, as is learning to talk, and that children ought to learn to read from authentic texts, which are to be distinguished from made-for-school texts. Whole language advocates prefer the expression "emergent literacy" rather than "beginning reading." Whole language teachers cultivate literacy rich environments; they seldom, if ever, engage in direct instruction. Whole language also stands for empowering the disenfranchised. Administrators and other authority figures, basal reading programs, and the "system" are regarded as usurping prerogatives that rightfully belong to teachers, and ultimately to students.

Many of the features of whole language are independently endorsed by reading educators who do not consider themselves to be part of the whole language movement. Among eclectics, at least, a literacy rich environment and direct instruction go together without contradiction. Among those known for their advocacy of systematic phonics, instruction in letter sound correspondences is not seen as inconsistent with a commitment to authentic literature.

If winning the allegiance of a lot of teachers is the criterion, whole language is a success. The philosophy is espoused by increasing numbers of teachers from every region of the country; in many quarters, it is simply taken for granted that whole language is the standard for what is good practice in reading and language arts. There is no question that, in many respects, the influence of whole language has been positive. For instance, the movement has been an effective force against some of the worst features of conventional reading instruction, such as over-reliance on workbooks and skill sheets. The whole language movement deserves part of the credit for the surge in the amount of writing children do in elementary school classrooms around the country. By other criteria, the evaluation of whole language is less certain: Most worrisome, there is evidence that suggests a high incidence of failure to learn to read in whole language classrooms among children who enter first grade with the least understanding of literacy. Whole language advocates insist that taking a position on an issue in literacy is always a political act. Regrettably, as if to prove the point, some of the most visible advocates have proved no less intemperate and rancorous than the phonics extremists.

Actually, for several reasons, research on whole language is inconclusive. If it is a philosophy, and not a method, then empirical research seems pointless, or so some believe. Whole language advocates are suspicious of quantitative and experimental methods. They reject tests, most especially standardized tests, because they believe that tests fragment literacy and that taking a test is not an authentic literacy experience. Moreover, in the eyes of some, eschewing tests is a political imperative, because tests are tools of the establishment. In the place of quantitative comparisons, whole language advocates offer

case studies that paint pleasing pictures of whole language classrooms. To the complaint that case studies are inconclusive and susceptible to subjective interpretation, the reply is that whole language has to be judged on its own terms.

Goals and methods in reading research. The dispute over what to weigh as evidence in decisions about phonics instruction and whole language classrooms is only one installment in a continuing debate about goals and methods in educational research. The methods of educational research have been the methods of social science, which in turn have been heavily influenced by the philosophy and methods of the natural sciences. This can be called the tradition of *scientific research*.

Now an alternative approach, termed by one authority *interpretative scholarship*, is challenging the hegemony of scientific research in education. Interpretive scholarship involves qualitative methods that are drawn from several disciplines, most notably anthropology. The distinctive feature of interpretative scholarship is that it aims to describe the meanings of events from the point of view of the participants. This first person point of view is to be distinguished from the third person point of view taken in scientific research, as signified, for instance, by the use of the term "subject" to refer to a participant in a scientific study.

What is the proper form and what are the proper methods for educational research? Polemicists on both sides of this issue argue for only one approach. There is, however, a good case for both approaches. To those who say scientific research is the only approach, the appropriate reply is that interpretative scholarship can enrich understanding and allow issues to be addressed which are difficult to examine in scientific research. To those who say interpretive scholarship is the only approach, the appropriate reply is that this dismisses a tradition of scholarship with several centuries of success behind it, including palpable achievements within education.

Debates about philosophy of science and research methods aside, the field desperately needs research to help educators decide among alternative proposals for reading and writing instruction. To be deflected from doing the research, or to fail to insist that research be considered in decisions about curriculum and methods in reading and writing, on the grounds that the research will not persuade ideologues, is tantamount to allowing ideology to prevail over rational and empirical analysis.

Criteria for Selecting Research Projects

Greater progress in research and development can come from powerful science than from grinding, normal science. Powerful science is more likely when scientists and those who sponsor science observe the following criteria.

- *The priority criterion:* Attack the most important problems.
- *The knowledge criterion*: Attack problems whose solution will lead to the greatest advance in knowledge.
- *The feasibility criterion:* Attack problems the field can solve.
- *The implementation criterion*: Attack problems whose solutions can be implemented readily.

Honoring the priority criterion and the knowledge criterion requires acute judgment. Honoring the feasibility criterion means paying attention to the number and quality of qualified personnel in a speciality and the promise of the ideas and methods they are able to bring to bear. Educational research often flounders on the shoal of the feasibility criterion: The relevant disciplines lack the

conceptual or methodological tools to seriously address the problem, or the people who possess the tools are not interested in working on the problem.

Honoring the implementation criterion might mean, for instance, making a disproportionate investment in research on textbooks, even though textbooks are a less important influence on students' learning than the quality of teaching they receive. Yet, only a hundred or so publishing company executives need to understand and accept a finding for it to get into widespread practice. For the same finding to reach the minds and hearts of a million school teachers would require a far greater effort.

Some Suggested Research and Development Programs

The five programs of research and development discussed in this section are highly likely to advance knowledge about reading and instructional practice. The principle for ordering the programs in this section is that the earlier programs are in one sense or another foundational for the later ones.

1. The Nature of Reading

Reading is a dynamic process that unfolds in time, with different types of activities occurring at different moments. What readers comprehend after having read a passage is the result of these moment-by-moment activities. In the ultimate sense, to understand what reading is is to understand the nature of these activities: what they are, when they occur, how they are controlled, what visual and stored information are involved in them, and how they change with instruction and experience. To understand reading development is to understand how these activities are different in children and adults.

Considerable progress has been made during the past 15 years in understanding the moment-by-moment activities of reading. The field is now at the point where formal models of a number of aspects of the reading process are being proposed and tested. Answers to a number of important questions, however, are still incomplete: What are the perceptual processes that take place during eye fixations in reading? What is entailed in word identification? What are the processes required for the representation of the meaning of propositions? Which of many possible inferences will be made during reading? How do readers construct summaries of texts? How do readers build representations of the situations described in texts? Answering these questions must be a high priority for reading research.

Children's perceptual processes during reading are also in need of further study. When children are compared to adults, puzzling aspects in their perceptual activities emerge. Adults typically fix their eyes on a word just once during reading, where children tend to direct their eyes to the same word for several fixations. Yet if the word is changed between fixations (by means of a computer) they are frequently unaware that anything has happened. Children display many short eye movements, often keeping their eyes on the same letter. The suspicion is that there is a developing coordination between visual attention and higher level language processes. But there is a need for many more developmental studies of dynamic processes during reading.

Research-based knowledge constrains, or ought to constrain, discussions of instructional materials and teaching techniques. Some approaches to teaching reading, for example, have been justified on the basis that "reading is a psycholinguistic guessing game" that involves sampling letters and words to confirm hypotheses. Research clearly demonstrates that reading is no such thing; skilled readers use virtually all of the information in the letters and words on a page. Other approaches to teaching reading appeal to the premise that identifying words entails recoding them into speech. This premise, too, is false; research informs us that skilled readers do not ordinarily, necessarily, translate words into speech before accessing their meanings.

The gulf between scientific research and discussions of how reading and writing are acquired and how they should be taught is increasing. Several reasons can be given to explain this gulf. One reason is the rise of interpretative scholarship mentioned earlier. This form of scholarship has a large following in the literacy field. Whatever its true merit, it has a seductive appeal for the scientifically uneducated who can, if they embrace this approach, excuse themselves from the technical rigors of science.

A second reason is that, especially since the dawn of neural network theories, cognitive science research in reading is increasingly opaque to intuition. Many cognitive and behavioral scientists doing research on reading see themselves as having little in common with literacy educators; they don't attend reading and writing conferences; they don't mingle with teacher educators or applied researchers, let alone teachers; their writing is impenetrable to most literacy educators; they neither shape nor are they being shaped by the practical field of literacy education.

2. Learning to Read and Write

The most fundamental issues in reading are how young children learn to read and write and how best to teach them. Yet we still do not have a satisfactory, comprehensive account of children's acquisition of literacy. What are needed are studies of the incremental changes in children's understanding and skill. The research should aim to reveal the typical progression in the development of literacy, if there is one, or the alternative courses of development. The studies should be designed to reveal how children are influenced by joint participation with adults in early literacy activities, such as listening to and discussing stories and using alphabet books, and, later, how they respond to, and are influenced by, the major components of school reading and writing programs.

Studies should examine the social contexts of early literacy, addressing whether the pattern of development is influenced by the sorts of activities children participate in and the nature of their participation. To determine how these variations may influence development, the studies should pay attention to the detail of how activities proceed, including the roles played by parent and child or teacher and student, the nature of the support offered by the adult, the aspects of the task that are emphasized, and the nature of the child's involvement.

It is possible that different kinds of children succeed and fail in different reading and writing programs. Who is at risk in an intensive phonics program? Who in a whole language program? Who in a basal reading program? These questions should be asked, especially, about children who come from homes where literacy is not promoted.

All facets of reading and writing should be considered in these new studies of early literacy, including influences on children's construction of meaning and their personal responses to literature. There is good reason, however, why research and development should give special attention to how children learn to identify words accurately and fluently. Recent research has reaffirmed the central importance of word identification in learning to read and provided new leads about how the process works. Yet teachers have been getting mixed messages. Some researchers claim that the importance of word identification has been exaggerated, and insist that children can readily discover what they need to know about word identification simply as a byproduct of suitable reading and writing activities. Other researchers maintain that direct instruction in phonics is the best way to teach word identification. The cacophony of voices has left teachers confused. There is evident and pressing need for clarity on the best route for children to develop the ability to identify words.

Children in the primary grades are doing much more writing than they did a decade ago. In addition to being a valuable aspect of literacy in its own right, there are a number of indications that writing promotes reading. Further research should investigate the interrelationships between reading and writing development. Does being engaged in writing promote children's phonemic awareness, spelling, and word identification? If so, under what conditions? What are the consequences of encouraging

children to use invented spellings, and how do these compare to the consequences of expecting children to produce conventional spellings?

It is now clear that *phonemic awareness* serves as a crucial part of the foundation for learning to read. Phonemic awareness is the ability to segment spoken words into the sounds that comprise them. Research establishes that children who can hear the sequence of phonemes in spoken words usually learn to read easily; without this ability, learning to read is very difficult. Initial studies have revealed that phonemic awareness can be taught. These studies need to be extended. Early literacy activities need to be examined to determine whether, as typically used, they promote phonemic awareness. New activities to promote phonemic awareness should be designed and evaluated.

A specific issue that needs investigating is what the units of word analysis are for children of different levels of development. Research indicates that adults normally use all of the information available in the letters and associated sounds when identifying words. For a child learning to read, though, initially words may be identified using only partial letter and sound information, perhaps only the first letter and a helpful context. But we have incomplete answers to several questions. What aspects of letter and sound information do children at different stages of development use? Does what they use depend on how they are taught? When do they begin to analyze words in terms of useful parts such as roots and affixes and onsets and rimes [e.g., *t* and *-eam* in *team*]. Which activities and instructional practices promote children's ability to use the information in word parts? A better understanding of the aspects of letter and sound information that children are able to use will be valuable in improving methods for teaching reading.

One of the most urgent research topics is the education of children from linguistically diverse backgrounds. It is simply not possible to assume that learning to read a second language is the same as learning to read in one's first language. One line of research needs to examine the cognitive processes of bilingual students reading in both their first and their second language. Such comparisons can help answer several questions: What are the specific differences between reading in the one's first and second language? What are the sources of difficulty for reading in the second language? How do skills and knowledge in the first language affect reading in the second language?

3. The Acquisition of Knowledge

A persistent problem in American education is the difficulty many children have in acquiring knowledge from the written word. This is a problem with multiple causes including poor quality of textbooks, acquisition of vocabulary, and naive theories about learning. A major cause of difficulty in acquiring knowledge is the poor quality of textbooks. Textbooks often don't present a treatment of a subject matter that is recognizable to practicing members of the discipline. Textbooks often speak with the voice of omniscient authority and often don't reveal the basis for the assertions they present. Seldom are hedges and qualifications included. Rather than explaining and justifying models in a field of inquiry, they "cover" the subject matter.

Textbook quality. In the most fundamental terms, the poor quality of so many textbooks reflects lack of understanding, or misunderstanding, of the nature of knowledge in subject-matter disciplines. The improvement of textbooks requires not just more money, or better intentions, but a better understanding of what knowledge in a subject matter looks like, and how this knowledge is acquired.

The picture that emerges from analyses of textbooks is of pages that are densely packed with information, but that explain and illustrate few concepts adequately for young readers. Vast stretches of history, geography, and science are compressed into brief passages.

Textbook presentations often have a flat structure with little differentiation of important and less important information. Asides and digressions may get as much space as what presumably are central ideas. For instance, 40% of a brief section in the same textbook, supposedly describing the size, location, and physical features of the Sahara Desert, is actually taken up with a description of the Kalahari Desert and the fact that *Sahara* means *desert* in Arabic.

Explanations in textbooks frequently don't explain very well. The point of an explanation may be obscure. The steps may be in an illogical order. There may be gaps that must be filled by the reader, if the explanation is to make sense. The explanation may contain premises that young readers will find implausible. Before-after, cause-effect, part-whole, or member-set relationships may not be explicitly marked, but left for the reader to infer.

A not insignificant reason for poor textbooks is a misguided standard for what will make a book easy enough for students to comprehend. Publishers and schools rely on readability formulas, according to which a book is readily comprehensible if it possesses two features: It has easy words. It has short sentences. By these criteria the following passage ought to be easy:

> The world is all that is the case.
>
> The word is the totality of facts, not of things.
>
> The world is determined by the facts, and by their being all the facts.
>
> For the totality of facts determines what is the case, and also whatever is not the case.
>
> The facts in logical space are the world.
>
> The world divides into facts.
>
> Each item can be the case or not the case while everything else remains the same.

The foregoing passage is the opening statement from a famous work on logic and philosophy by Ludwig Wittgenstein (1961, p. 7). Most people do not find it easy to understand, despite its uncomplicated syntax and familiar words. Easy words and short sentences do not guarantee ease of comprehension. Likewise, complexity of syntax and unfamiliar words are not so much the causes of difficulty in comprehension as they are symptoms that a passage is about a complex, unfamiliar subject.

Trying to make a text more readable by shortening the sentences may actually interfere with comprehension. The *becauses, thens,* and *howevers* are removed and students are left on their own to figure out how propositions relate to one another. "Editing to formula" is one of the reasons that some textbooks are filled with choppy, disconnected passages and explanations that don't explain.

That easier words will make a textbook less difficult to understand may seem to be an uncontroversial proposition. Unfamiliar words are always the first obstacle to comprehension that students mention. Still, the proposition is at best a half truth. Technical vocabulary--if rightly explained and rightly used--can make a text easier to understand. How, for instance, can one talk intelligibly about the anatomy of the heart without using the term *ventricle?* Technical vocabulary is itself a component of the content to be learned from textbooks. In short, when and how to introduce technical vocabulary are matters of great importance to both textbook authors and classroom teachers. Studies of vocabulary must be regarded as foundational in any program of research on the acquisition of knowledge.

A basic problem with the notion that "easier words make for easier texts" is that the notion of "easy words" is itself problematical. What makes a word easy or hard is not a simple matter. Readability formulas use word length or word frequency as indices of word difficulty, but neither length nor frequency necessarily make a word easy or hard.

Recent evidence suggests that whether a word is difficult or easy is primarily a function of how difficult a concept it represents. In the passage from Wittgenstein quoted earlier, *space* is an easy word and *logical* is not so hard, either. It's when the two words are combined in the phrase *logical space* that comprehension becomes uncertain. The reason is that "logical space" is an unfamiliar concept to most readers.

Recognizing conceptual difficulty as the major factor underlying vocabulary difficulty is an important step forward. Rather than to provide immediate practical answers, it serves largely to uncover the next layer of research questions: What types of concepts are especially difficult for students? Are teachers able to determine which words are likely to be conceptually difficult for their students? To what extent is the conceptual difficulty of a word a function of its role in the text? What methods of instruction are especially effective or ineffective for difficult concepts?

Teachers often try to make a technical subject easier by "preteaching" key vocabulary, that is, by introducing selected difficult but important words to students before they read a textbook chapter. Frequently, students are asked to look the words up in a glossary and use each one in a sentence. This tedious exercise doesn't work very well, especially when the students don't know the words or lack background knowledge about the topic. Why is this widespread practice ineffective?. One reason is that students are surprisingly inept at learning new meanings from definitions. To illustrate the problem, given the definition of *usurp* as "to seize and hold power, position or authority by force and without right," one child produced the sentence, "He has the usurp to put me in jail." This response is evidence of a rather deep misunderstanding of the definition. More research is needed to answer questions such as: Can conventions for writing definitions be improved, so that word meanings are made accessible to more young readers? Can instruction in using glossaries and dictionaries be improved, so that young readers will have a better chance of digging the meanings out of definitions?

Other important questions about children's vocabulary growth remain unanswered or have answers that are controversial. Functionally speaking, for children at different levels of development, what is a word? For instance, is there an age at which *loyal*, *loyalty*, and *disloyal* are treated as entirely distinct words? Is there a later age at which these words are seen as members of a family, such that as soon as the meaning of one is known the meanings of the others are easily figured out? What are the relative contributions of oral language experience and reading to children's vocabulary growth? What must a child know about the nature of word meanings to have a good chance of learning a word upon simply hearing it or reading it in context? Can instruction be designed that will help children become better independent word learners?

Bilingual children often have a limited English vocabulary, and this is no doubt one reason they may experience difficulty learning from textbooks. Most technical vocabulary, however, has a clear morphological structure and roots that are found in many languages. Thus, bilingual children may know *cognate words*, or words in their first language that are related in form and meaning to the technical vocabulary of English. The extent to which bilingual children notice and use cognates is unexplored territory that should be examined in future research.

Children's naive theories. Teachers and textbook authors seem to proceed on the assumption that students' minds are blank slates. Yet, the most fundamental insight we have is that learning depends upon prior knowledge. More important than particular facts the student knows, or does not know, is the system of concepts that the student will bring to bear on the topic. Even when it may seem that students do not know anything relevant about a topic, recent research reveals that they will be applying what have come to be called *naive theories*. A naive theory is a set of ideas students have spontaneously developed to make sense of the world around them, as well as the things adults tell them.

Students' naive theories may be at odds with the theories they encounter in school. Because of commitments to their naive theories, students may find teachers' or textbooks' explanations that are couched in terms of "expert" theories incomprehensible, or they may distort these explanations to make them consistent with a naive theory, or they may compartmentalize--using a version of the expert theory for school work but hanging on to their own theory for life outside of school. The conflict between naive and expert theories has been documented in several areas of science, and no doubt occurs in the humanities and social sciences as well. For instance, we know from research that children whose experience tells them the earth is flat may preserve this belief, and at the same time accommodate the "expert" assertion that the earth is round by interpreting the expert assertion to mean that the earth is round like a pancake, instead of round like a ball, or by supposing there are two earths, the flat one we walk around on and the spherical one pictured in science books.

The nature of naive theories, how children come to formulate them, and the conditions under which they will change is an exciting area of inquiry, with many unanswered questions that should be pursued vigorously. We need a characterization of naive theories in each area of the curriculum for children of various levels of development. We also need an understanding of how students can be led to change their naive theories. Such theories have proved amazingly resistant to change. In fact, no effort to date has proved especially successful in getting students to abandon naive theories and replace them with expert theories.

4. Critical Reading and Thinking

Evidence continues to appear that American students do not reason well about written material. We need to find out why and what to do about it. Educators consistently say they support instructional methods that emphasize inquiry, problem solving, and reasoning. At the same time, descriptions of classroom instruction show that little time and attention are given to promoting higher order thinking. This contradiction suggests that there must be forces operating against the kinds of instruction that promote higher order thinking. Research ought to try to identify what these forces are.

One plausible force operating against the teaching of higher order thinking skills is the widespread assumption that skills and knowledge form a hierarchy or pyramid. In the case of reading, skills near the bottom of the pyramid include knowing consonant blends, dividing words into syllables, and finding words in a dictionary. Near the apex are skills such as evaluating the logical consistency of an argument or formulating reasons in defense of a position. If a teacher always starts at the bottom, so to speak, with the lowest level skills students have not yet mastered, higher level skills may get crowded out of the curriculum. Commitment to the notion of a skills hierarchy may explain the finding suggested in some research that high-ability reading groups are allowed to spend more time in intellectually stimulating discussion of texts than are low-ability reading groups. Is this apparent difference in the hidden curriculum of reading groups of different levels justifiable in terms of the long-term progress of the children? Or, are children in low groups being short changed?

Another possible force operating against teaching that promotes higher order thinking is the pressure teachers feel to cover the curriculum, defined as completing the textbook and accompanying exercises. Another force is the pressure to prepare students to pass school-mandated or state-mandated tests that may not stress skills over thought. Of course, holding teachers and students accountable for performance on tests is at the forefront of the current educational reform movement. It would be a bitter irony if educational reform were to *depress* the level of thinking in our schools. Research can bring answers to a number of questions about tests and time. What skills and abilities do educators assume are required for students to pass various kinds of tests? What do they assume is the best short-term method of preparing for tests? What skills and abilities, in fact, improve performance on various mandated and recommended tests? How does the allocation of time to different activities and the character of classroom discussion change as the result of tests?

Added to these forces is the basic problem that large number of teachers may not have instructional strategies for cultivating higher order thinking. In the conventional reading program, children discuss a story every day, but typically the discussion consists of a recitation to make sure that the children have grasped the main points of the story. Beyond this, good teachers lead children in a search for some broader moral implied by the story, but, again, such lessons seldom call for the exercise of critical thinking. Within the field of reading, there simply are not well-worked out and widely recognized instructional strategies for promoting critical thinking. Designing, evaluating, and disseminating strategies for enhancing critical reading and thinking ought to be a priority for reading research and development.

5. The Education of Reading Teachers

The quality of the instruction children receive is a major factor in their rate of growth in reading. Quality of instruction is a category that includes teachers' (a) ability to motivate children and inspire them to read widely, (b) knowledge of and skillful use of best available methods and strategies, (c) command of effective teaching techniques, (d) ability to adapt lessons to take account of the needs of individual children, and (e) skill in managing a classroom so as to make it a pleasant and productive place.

Except for children's reading level at the beginning of any given school year, the quality of instruction is perhaps the overriding factor in children's growth in reading during that year. It must be acknowledged that, although this conclusion is sensible, it is hard to prove: The conclusion is an inference drawn from the fact that there is usually considerable variation in end-of-year performance among classes that use the same reading program. Research should attempt to pin down the role of effective instruction in children's reading growth.

According to *Becoming a Nation of Readers* (Anderson, Hiebert, Scott, & Wilkinson, 1985, p. 120), "America will become a nation of readers when the verified practices of the best teachers in the best schools can be introduced throughout the country." Regrettably, research in classrooms has consistently shown that average practice falls considerably short of best practice. Why is this so? The general form of the answer is that teacher education is woefully inadequate and that teachers typically have limited opportunities for continuing professional growth and development.

A major shortcoming of teacher education is that it depends too much on lectures and textbooks. Preservice teachers, especially, do not have the experience with children or with teaching to make sense of all this abstract talk. Yet, the solution is not as simple as more involvement in classrooms and extended time in student teaching. The classroom in which a would-be teacher observes may not be exemplary. If it is exemplary, the would-be teacher may miss the features that make it exemplary because she does not have trained eyes. In addition, reliance in teacher education upon classroom involvement alone might well increase the grip of what has been called "the hand of the past" on the prospective teacher's mind and heart.

A similar problem plagues inservice teacher education. There is an overreliance on brief and superficial workshops. If the method introduced in a workshop is at all complicated, teachers will not have a real opportunity to master it. This is probably one reason that complicated procedures such as reciprocal teaching have proved to have highly variable effects when evaluated at different sites around the country. In the hands of the pioneers and teachers trained by them, reciprocal teaching produced striking results; the results produced elsewhere were often smaller and sometimes not significant.

Research should attempt to identify the features of successful teacher development programs and the weaknesses of less successful programs. Differences between the two that are likely to be critical are that the former find a way to integrate theory and practice and find a way to provide extensive practice

with timely coaching and feedback. For example, in Reading Recovery, the highly successful program for first graders at risk of reading failure, the centerpiece training is the "behind-the-glass" session in which a teacher conducts a lesson behind a one-way window with a child with whom she is working on a regular basis. On the front side of the window, the other teachers-in-training are led by the teacher trainer in a vigorous discussion of the behavior of the child, the moves made by the teacher, the rationale for the teacher's moves, and other moves the teacher might have made. During their training year, Reading Recovery teachers teach four or five behind-the-glass lessons and participate in discussions of 50 or so lessons taught by their fellow teachers.

There is a consensus that Reading Recovery has such a high and consistent success rate because of the quality of its teacher training. This training is rather expensive and it would not be feasible to use the same procedures with teachers instructing groups of children. Still, the principles embodied in Reading Recovery and other successful programs ought to be generalizable. In the place of live, behind-the-glass lessons, research and development projects ought to examine role playing, micro-teaching with students who are paid volunteers, and the extensive use of videotape.

Conclusion

As I stated at the start of this report, my intent here has been to present a broad view of the field of reading research. My hope is that the report will serve as a context for discussions among researchers, practitioners, and others interested in reading education and research about the future directions of the field.

References

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